



EHC-O[®] and O-Sox[®] for VOCs RECOMMENDED BASELINE SAMPLING

Summary

This document provides guidelines for baseline sampling prior to injection of EHC-O[®] or application of O-Sox[®] for accelerated aerobic bioremediation. The baseline would ideally consist of the following analyses in the treatment zone monitoring locations installed prior to injection:

Critical Parameters:

- Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (sVOCs)
- Total Petroleum Hydrocarbons (TPH)
- pH
- Dissolved Oxygen, Redox Potential (Eh)
- Chemical Oxygen Demand, COD, in soil and groundwater
- Biological Oxygen Demand, BOD, in soil and groundwater

Non-Critical Parameters:

- Total Organic Carbon in soil (TOC) or fraction organic carbon, *f_{oc}*
- Reduced Metals such as dissolved iron, manganese
- Reduced inorganics such as sulfide, nitrate, chloride
- Alkalinity and/or Hardness

Critical parameters are used to assess the applicability of an aerobic treatment approach, and they can establish a baseline for potential secondary plume constituents (e.g. heavy metals). The non-critical parameters are optional, but they can provide general information about the soil and water chemistry which may be useful when analyzing performance monitoring data.

General Soil and Groundwater Chemistry

At a minimum, we recommend measuring pH, Eh, DO and TPH to evaluate the conditions within the impacted area. These will help us to establish the loading requirements and to select the appropriate EHC-O[®] application rate. In addition, BOD and COD are recommended to provide a more refined estimation of the EHC-O[®] dosage.

Estimation of Oxygen Demand

The most comprehensive way to estimate the oxygen demand for a site is by directly measuring either the COD or BOD in soil and groundwater. The COD and BOD include the oxygen demand from everything in the sample that could be either biologically or chemically oxidized respectively, including the natural oxygen demand.

Alternatively, if these parameters are not available, the oxygen demand could be estimated from the TPH or individual VOCs in the soil and groundwater via Stoichiometric calculations. If only groundwater data is available, the sorbed concentrations are estimated using soil organic carbon partition coefficients (Koc) and foc values.

In addition, the natural oxygen demand in the soil and groundwater has to be considered, including naturally occurring degradable organic carbon, reduced metals (e.g. ferrous iron) and inorganics (e.g. nitrite and sulfide). DO levels and ORP will also indicate whether naturally occurring metals and inorganics could be expected to primarily exist in a reduced or oxidized state.

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